


Situational Awareness Improves the FBCB2 Picture

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Many of the ground and aviation platforms in Afghanistan and Iraq are equipped with Force XXI Battle Command Brigade-and-Below (FBCB2) or its satellite, sensor and communications-based variant Blue Force Tracking (BFT). The capabilities and benefits of these systems have been widely reported and praised during *Operations Enduring Freedom (OEF)* and *Iraqi Freedom (OIF)*. This article will discuss how the FBCB2 situational awareness (SA) picture can be improved.

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FBCB2 Capabilities

FBCB2 is the principal digital battle command system at the brigade and unit level. All users are robustly networked via terrestrial and satellite communications. FBCB2 takes a feed from a Position Location Device and displays the platform's position on a digital map or satellite image background. All platforms share their own positions periodically, and so we build a Blue SA picture, which is also provided to tactical operations centers and command centers. The important point is that Blue SA is totally hands-free. Hooking on a Blue icon reveals more detailed information and provides access to a simple text messaging capability to the FBCB2 user. FBCB2 also enables command and control (C2) messages to be sent between it and other systems such as the Maneuver Control System (MCS) and the All Source Analysis System (ASAS). Some C2 messages are about entities on the ground, which FBCB2 exploits to provide SA and a geographic reference

(georef). For example, upon sighting enemy forces, the FBCB2 users generate a SPOT Report — a C2 message that they send to their chain of command. FBCB2 extracts the georef information from the SPOT Report and automatically generates a Red icon, which is then distributed across the network to build the Red SA picture of enemy troop movements or positions. Other C2 messages such as bridge reports; obstacle reports; fire mission messages; nuclear, biological and chemical reports; threat and strike warnings also spawn SA or georef SA.

FBCB2 also interfaces with platform devices and other systems to assist in SA generation. For example, the Laser

Range Finder's Far Target Locate capability enables accurate location information of Red and georef SA, and

nuclear, biological and chemical sensors can autosend alert messages and autogenerate SA via FBCB2. Hooking on Red or georef SA again reveals more information and enables subsequent management of that information to modify or delete it.

FBCB2's SA automation safety capability is awesome. Blue SA is hands-free, and Red and georef SA is automatically created from C2 messages sent by operators. The FBCB2 user's situational understanding is enhanced when this SA is considered in accordance with the commander's intent and operations plan because FBCB2

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Marines from the Weapons Co., 3rd Battalion, 6th Marine Regiment, travel through the region in Khowst, Afghanistan. The battalion is conducting vehicle checkpoints and village assessments while maintaining an offensive presence throughout the region in support of *OEF*. (U.S. Marine Corps photo by LCPL Justin M. Mason, 2nd Marine Division Combat Camera.) Inset photo depicts an FBCB2 3-D visualization prototype.



A Soldier demonstrates hooking an icon so that a more detailed description of who or what the icon represents appears on screen. (U.S. Army photo by Mike Roddin.)

enables operations overlays to be displayed along with the SA.

SA Benefits

For *OEF* and *OIF*, there is no doubt that FBCB2 SA enabled faster and improved battle command at all echelons — for senior leaders at the Combined Forces Land Component Command level and for subordinate commanders. It helped them to:

- See U.S. force positions and progress on a map or satellite image.
- Compare force positions to overlays of the overall plan and its control measures.
- Depict the tasks, mission and commander's intent.
- Make or convey decisions to synchronize maneuver and effort.
- Streamline combat support and combat service support (CSS) initiatives.

Better SA resulted in greater lethality, increased survivability, higher tempo operations and a dramatic increase in mission effectiveness. Blue forces become

more confident in their abilities because FBCB2 helped lift much of the fog of war.

Improving SA

As successful as FBCB2 has been in supporting ongoing *OEF* and *OIF* operations, there are still numerous lessons learned that provide room for improvement. These basic questions provide the framework for what FBCB2 must address:

- Where am I?
- Where are my buddies?
- Where is the enemy?
- What else is in my battlespace?

Where Am I?

While FBCB2 SA information sharing is a fundamental component of the network-centric force, it is important to recognize that FBCB2 SA also provides for individual platform navigation needs

as well. There are two aspects to navigation: knowing where you are, and having an accurate representation of the terrain you must traverse. Global Positioning Systems provide very accurate position location, which is then plotted onto the FBCB2 display. In the past, this display has normally been a map, but in Afghanistan and Iraq, it is often better to use satellite imagery background that is cross-referenced against the grid reference system.

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Imagery down to 1-meter resolution provides far more up-to-date ground representation, accounting for new development, battle-damaged infrastructure, the seasons, forestation, crops and population migration. FBCB2 further assists the user through navigation tools that give steering instructions to waypoints. The combination of these capabilities

means that FBCB2-equipped platforms can navigate easily and accurately, even in the most extreme weather and limited visibility situations. Of course, digital vector mapping, imagery and the capabilities of future mapping tool kits will enable commanders and their Soldiers many more ways to view the ground — even in 3-D. This capability is actually available now through an FBCB2 3-D prototype.

Where Are My Buddies?

FBCB2 does a good job of sharing the locations of its users to enable them to see those in their chain of command and anyone else in their battlespace. Of course, there are many systems that provide Blue SA, such as the Movement Tracking System and other systems of the Joint community and our allies. This Blue SA must be made available to all FBCB2 users *and* other systems and users. Currently, many deployed U.S. Forces' sensor systems have little if any capability to identify friendly force locations. Likewise, we must also consider Blue SA level of description and location accuracy. Is it good enough to know that unspecified Blue Force platforms are engaged in an area of operations and get updates every 15 minutes, or do you want to know that 3 Blue tanks, 2 Blue Infantry Fighting Vehicles and 1 Blue Humvee are on a specific road? For FBCB2 users, Blue SA supports synchronization of effort, helps coordinate maneuver and helps prevent fratricide, just to name a few.

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Where Is the Enemy?

Shared Red SA is as important to operational commanders as Blue SA because it enables FBCB2 users to avoid enemy strengths and exploit enemy weaknesses at the local level. FBCB2 also enables commanders to bring to bear networked force power to target and destroy the enemy with long-range precision fires. Currently, most Red SA seen on FBCB2 is provided by other FBCB2 users through "bottom-up" reporting. Very little comes from ASAS. But the real issue is that very little Red SA is seen on FBCB2 at all — very little that is, compared to the amount of platform-level Red SA that must be available.

There are many sensor systems deployed now, and many more will be deployed in the future because of advances being made in unmanned aerial vehicles (UAVs) and ground vehicles. Typically, many new products support the military intelligence collection process to provide commanders enemy assessments. These sensor systems must be fully integrated with FBCB2 in contributing significant data to the Red SA picture to better track in near-real-time enemy platforms. Indeed, if undigitized friendly platforms and neutral platforms can be correlated with sensor tracks, then these systems could be continuously updated as Blue or Neutral SA.

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What Else Is in My Battlespace?

FBCB2 georef SA includes minefields, obstacles, bridges, hazards/alerts and CSS supply points. There is so much more information, just as useful, that could be disseminated. For example, given the ongoing operations in Iraq, FBCB2 could display icons representing police stations, hospitals, municipal offices, schools, mosques, telephone exchanges, water treatment plants, oil wells, pipelines, gas stations, sewer systems, culverts and other sites of political, cultural or religious significance.

Georef SA need not be limited to locations only. It could include coverage areas for weapon, surveillance and communications systems. It could include effects of weather on visibility, mobility and other operational considerations. Georef SA could include events such as marches and demonstrations, festivals, soccer matches, state events and the different routes for public transportation and access.

FBCB2 can potentially store and display a tremendous amount of geographic reference information that can be displayed as SA on a map or satellite ground image. However, there are a few challenges to overcome. First, the sheer volume of new information to be sent over tactical communications might seem daunting to some, but FBCB2 can handle it. Second, will *Military Standard 2525* support such a variety of information, and if it does, will

the user be able to understand such a big lexicon of symbols? We can counter this challenge by using more descriptive symbols or "pop-up descriptions" when the cursor is placed over the icon.

A greater challenge, though, is to establish who is responsible for generating and then managing georef SA. Georef SA management will become a Joint endeavor for FBCB2 and the other sensors and systems generating output. However, information management will require G-staff level support from intelligence, operations, logistics, civil military operations and communications. FBCB2 information can be sourced and managed by staff or systems from many echelons of command from battalion to the highest levels. The “source” of SA is of little relevance to local users. They just want to know what is in their battlespace.

SA Linked Information

SA information is more than just icons represented on a map. By hooking an icon, the user can see a more detailed description of who or what the icon represents and can also gain access to other linked information. For example, FBCB2 users might see an icon on their screen depicting a Red tank. Clicking on that Red tank could provide more information about that platform such as type, speed, course, status and support elements. Other information might include images from a UAV or other sensor platform.

One can see that information about the Red tank may have come from many sources. By clicking on a bridge icon, a user might see a photo image, the bridge’s weight limit or the technical specifications from the construction company’s Web site. Likewise, clicking on a media event might show the latest media reports, or clicking on a site of religious importance might provide essential protocol rules.

Clicking on the school might provide the names and contact information of the teachers.

These are varied and quite abstract examples, but they emphasize the kinds of information that could be conveyed as SA via the displayed icon as linked information. In effect, the icons on the map are information windows that can be shaped depending on the user’s role, mission, task, scenario and type of operation, more so probably in military operations on urban terrain.

Clearly the greatest challenge will be establishing who gathers all this information and makes it available via the SA icons. There is huge potential for automated knowledge management capabilities to discover and categorize elements that exist and have a geographic reference, and then discover and categorize information about those things as well.

FBCB2’s true value is its ability to share critical information with all other FBCB2-equipped platforms quickly and accurately. This capability helps leaders visualize their battlespace in terms of friendly and enemy forces, the terrain and other georef information including hazards and graphical control measures. This shared FBCB2 SA enables faster and improved battle command, reduces fratricide, increases survivability among friendly forces and leads to greater combat effectiveness and operations tempo. It enables friendly forces to act inside the enemy’s decision cycle at a pace the enemy can’t match. Blue Force Tracking devices that populate the common operational picture at command posts do not provide the above information

down to unit level. They support the higher level commanders, but do nothing for mounted or dismounted warfighters on the ground.

As we continue to push the limits of our technological capabilities, FBCB2 and other supporting systems must address critical issues concerning managing the distribution of SA to account for bandwidth availability for all users, display filtering and proper identification, security of information and exploitation of SA information to infer knowledge for the user/system. It is hoped that this article has made the reader aware of FBCB2’s awesome capabilities and potential, and that we are only scratching the surface regarding its future contributions to operational effectiveness.

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